

## BIOLOGY OF THE NEW CHALCID PARASITE CIRROSPILUS INIMICUS GAHAN

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While making a study of hymenopterous parasites associated with *Samia cecropia* Linnæus in the Chicago area (Marsh '34), the writer found a black-and-yellow chalcid which A. B. Gahan determined as a new species of *Cirrospilus* Westwood. Upon request Mr. Gahan has kindly described this species (Gahan '34) and assigned to it the name *C. inimicus*. Opportunity is here taken to present some life-history details which were discovered during further study of this new species.

In the Chicago area this chalcid was found to be a secondary parasite of the ichneumonid *Spilocryptus extrematis* Cresson which served as the principal primary parasite of *Cecropia* in that region. *S. extrematis* is present in the field in the larval form throughout the year and *C. inimicus* is an active parasite of it whenever temperature conditions will permit. Adults of the latter may emerge as early as the last of April. A cycle is completed every eighteen to twenty-one days and the number of these cycles is determined by the duration of warm weather. At least three cycles are completed each summer. Males average 1.4 mm. in length, females 2.1 mm.

Upon emergence the adults of *C. inimicus* find themselves imprisoned within the host cocoon which, with numerous others, lies within the cecropian cocoon. They gnaw through the thin host cocoon. Escape from the cecropian cocoon occurs via the valve or holes made by those of their host which escaped parasitization, or through openings made by woodpeckers or mice.

Copulation occurs upon infected cecropian cocoons often within the first hour after emergence. The males are very ardent. Pre-copulatory behavior always consists of the male mounting the thorax of the female and engaging in a vigorous shadow-boxing performance with his head and antennæ. The antennæ are curved rigidly downward and the tips brushed across those of the

female or occasionally touching her lightly in the face. This hammering action, achieved mostly by the motion of the long neck, goes on rapidly for from ten to twenty-five times, then a rest of about a second, then a repetition of the motions. He appears in a state of intense excitement evidenced by the stiffening of the posterior pair of legs. Following the second or third series of boxing he backs, curves the tip of his abdomen under one side of the abdomen of the female and copulates at the base of the ovipositor for a brief ten seconds. Following this he usually remounts and repeats the boxing a time or two then dismounts and hurries away. If a second male comes along during the mounting the first male will frequently quickly dismount and drive him away with a great show of violence in the form a beating with his antennæ. However, about as frequently, the first male is too busy with his boxing to see the second male approach from the rear. The latter usually copulates with the female while she is thus distracted. One male has been observed to alternate between two females with great activity. The normal life of the male is about four days while the female usually lives about seven days.

The inseminated female immediately reenters the cecropian cocoon and searches for her host larvæ by palpation of the ichneumon cocoons with her antennæ tips. She works very energetically and persistently at the egg laying. After a hasty examination of a cocoon containing a live larva or pupa of her host she quickly curves the end of her abdomen down, places the tip of the ovipositor, then vigorously thrusts it through the silk. Such force is used that the ovipositor plunges through and usually strikes the larva or pupa inside, which immediately begins to writhe and twist under repeated proddings. In one instance a female was seen to pierce from beneath, a cocoon containing a nearly mature pupa. For twenty-one minutes she clung to the cocoon vigorously jabbing the writhing pupa, the latter repeatedly bending the ovipositor aside by a spiral, twisting motion. The activity of the pupa gradually slowed until finally the ovipositor was driven through its cuticle and twisted about for a time inside the abdomen. Then withdrawing the ovipositor the chalcid placed five eggs on the surface of the pupa. The host larva or

pupa invariably dies within a few hours after being pierced. In spite of its vigorous egg-laying habits, *C. inimicus* is not prolific. The female seldom lays over one hundred eggs.

The eggs are club-shaped and quite smooth, measuring about  $1.0 \times 0.3$  mm. Never more than eight were observed in any single cocoon of *S. extrematis*. Being only slightly adhesive when laid they may fall from the side of the host. In about forty-eight hours the larva suddenly breaks through the tough egg skin, punctures the host cuticle, and begins to drink the body fluids. It shifts constantly from one point to another over the surface until maturity is reached in about nine days. Larvae have been removed from the host, studied under a microscope and replaced at random repeatedly without any apparent disturbance in their development. Eggs laid by females which have not been inseminated always develop into males.

The pupa is quite flat, measuring 1.5–2.5 mm. in length. It differs from most chalcid pupæ in that it turns a glossy black in an hour or two after the larval skin flakes off. *C. inimicus* passes the winter in the host cocoon. It hibernates in the pupal form. Larvæ which are caught by cold weather invariably die.

#### LITERATURE CITED

- GAHAN, A. B. 1934. A New Species of *Cirrospilus* Westwood (Chalcidoidæ). Proc. Ent. Soc. Wash., Vol. 36, No. 5, May.
- MARSH, F. L. 1934. "A Regional Study of *Samia cecropia* and Nine Associated Primary Parasites and Hyperparasites." A Master's thesis. Northwestern University Library, Evanston, Illinois.